

REMARKS

Claims 1-7 are pending in the application. Applicant herein amends the claims to add claims 6 and 7.

A. Claims 1-4

The Examiner rejected claims 1-4 under 35 U.S.C. 103(a) as allegedly being unpatentable over Ito (USP 5,210,415) in view of Agano (U S 6,573,507 B1). Applicant traverses.

All Claim Limitations Are Not Taught Or Suggested

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382; *See* MPEP 2143.03.

The references taken as a whole do not teach or suggest the features of independent claim 1. Claim 1 includes, *inter alia*:

wherein the energy subtraction image signal is formed as an energy subtraction image signal having a pixel density lower than the pixel density of each of the radiation image signals.

The Examiner cites Ito for teaching "a method of forming an energy subtraction image" (Office Action, page 2) but concedes that "Ito is silent about the specific details wherein the energy subtraction image signal is formed as an energy subtraction image signal having a pixel density lower than the pixel density of each of the radiation image signals." (Office Action, page 2).

Because of this deficiency in Ito, the Examiner then cites Agano. The Examiner noted that Agano (column 14, lines 27-34) teaches the above feature. (Office Action, page 3) However, Agano (column 14, lines 27-34) teaches "...[w]ith the pixel density lowering process, new signal values corresponding to four pixels are obtained from the signal values of the read-

out image signal Sd, which correspond to nine pixels adjacent to one another” (column 14, lines 27-34).

Ito combined with Agano does not teach or suggest that the energy subtraction image signal has a pixel density lower than the pixel density of each of the two original radiation image signals. In other words, Ito teaches image subtraction and Agano teaches reducing the image pixel size to be a desired image size, but the combined references do not teach or suggest that the resultant energy subtraction image signal has a lower image density than the original two radiation image signals. Moreover, Applicant submits that one skilled in the art would not make such a modification given that the energy subtraction image signal is the difference between the two original radiation image signals. Rather, the natural inclination would lead to a resultant energy subtraction image signal with a different energy intensity than, but the same image density as the two original radiation image signals.

No Motivation To Combine

There is no motivation to combine the two references because the references implicitly teach away from the suggested combination. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983).

Ito is “a method for forming an energy subtraction image by accurately carrying out energy subtraction processing on all of the image signal components of image signals representing images.[emphasis added]” (col. 1, lines 7-11). “If the beam hardening phenomenon occurs to different extents for different parts of the object, the problems will occur in that patterns of unnecessary tissues are erased completely and only the patterns of desired tissues are embedded in a certain region of the subtraction image, whereas patterns of unnecessary tissues are not erased completely in a different region of the subtraction image. As a result, a subtraction image having good image quality cannot be obtained” (col. 3, lines 17-26). To overcome the beam hardening phenomenon, Ito uses a special correlation based on the image density in a radiation image. “[T]he difference in the extent of the beam hardening phenomenon

at different parts of the object has a correlation with the image density in a radiation image (i.e. the value of the image signal representing the radiation image). Accordingly, in the method and apparatus for forming an energy subtraction image in accordance with the present invention...the value of each of the parameters for the subtraction process is changed for different parts of each radiation image in accordance with the value of the image signal representing the radiation image [emphasis added]” (col. 5, lines 4-18).

Now, according to Agano, “[i]n [the] image pixel lowering process...the image signal components corresponding to the plurality of the pixels may be weighted, and the new image signal component may be obtained from the weighted image signal components” (col. 8, lines 55-59). Agano also mentions that “various processing techniques, such as a nearest neighbor interpolation technique, a polynomial technique [etc., may be used.]” (col. 8, line 67 through col. 9, lines 1-5). In short, Agano approximates a new image pixel or new image signal component from a plurality of pixels or image signal components, respectively.

Modifying Ito, by lowering the image pixel density as suggested by Agano, would degrade the benefit of the correlation process which is based on the complete image density: “energy subtraction processing on all of the image signal components of image signals representing images [emphasis added]” (Ito col. 1, lines 7-11). Ito would lose critical image density information required to make a correlation before performing image subtraction. Ito desires to minimize beam hardening effects that may erase parts of the object or not allow parts of the object to be erased during image subtraction. Removing vital information by lowering the image density of the radiation signals, as taught in Agano, would only augment this potential problem of beam hardening.

As the proposed modification would render Ito, which is being modified, unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *See In re Gordon*, 733 F.2d 900, (Fed. Cir. 1984); MPEP § 2143.01. Therefore, claims 1-4 are patentable over Ito and Agano.

B. Claims 2 and 4

The following remarks are for both claims 2 and 4. Claim 2 includes, *inter alia*:

the pixel density of each of the radiation image signals is lowered, a plurality of low pixel density radiation image signals being thereby acquired, subtraction processing is performed by utilizing the plurality of the thus acquired low pixel density radiation image signals...

Ito and Agano do not teach or suggest that “the pixel density of each of the radiation image signals is lowered” prior to energy subtraction. Agano does teach “performing a pixel density transforming process on the image signal” (col. 7, lines 6-7). However, neither Agano nor Ito teaches or suggests lowering the pixel density of the radiation signal prior to performing image subtraction.

Even assuming, *arguendo*, that Ito were to lower the pixel density before performing image subtraction, Ito would be faced with the problem discussed above. Namely, Ito would lose critical image density information required to make a correlation before performing image subtraction. Regarding claims 2 and 4, not only do the combined references fail to teach or suggest the limitation above, the teaching of each reference actually suggests that they should not be combined in the manner suggested by the Examiner.

Because the combined teachings of Ito and Agano fail to disclose the subject matter of the claims, Applicant respectfully requests the Examiner to withdraw this rejection of independent claim 1 and its dependent claims 2-4.

C. Claim 5

The Examiner rejected claim 5 under 35 U.S.C. 103(a) as allegedly being unpatentable over Ito (U S 5,210,415) and Agano (U S 6,573,507 131) as applied to claim 3 above, and further in view of Shimura (U S 4,859,849).

Applicant submits that claim 5 is patentable at least by virtue of its dependency on either claim 3 or 4, and therefore, Applicant respectfully requests the Examiner to withdraw this rejection of dependent claim 5.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/044,903

Attorney Docket No. Q66580

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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